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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,000	11/24/2003	Robert Gruenwald	BOW1335-003C	3379

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EXAMINER	
SHRIVER II, JAMES A	

ART UNIT	PAPER NUMBER
3618	

DATE MAILED: 02/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/721,000	GRUENWALD ET AL.	
	Examiner	Art Unit	
	J. Allen Shriver	3618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 November 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-46* is/are pending in the application.

4a) Of the above claim(s) *32 and 33* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12,14-23,28-31,34-41,44 and 46* is/are rejected.

7)☒ Claim(s) *13,24-27,42,43 and 45* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/24/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of the invention covered by claims 1-31 and 34-46 in the reply filed on November 8, 2004 is acknowledged.

2. Claims 32-33 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on November 8, 2004.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-2, 10-11, 17 and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Lyons et al. (US Patent 5,929,595). Lyons et al. discloses a hybrid electric vehicle (10) comprised of a drive train (See Fig. 1); an electric motor (40) for driving said drive train; a power unit/engine (16,18) electrically coupled to said electric motor; an electric energy storage system (20) electrically coupled to said electric motor; and wherein said power unit and said electric storage system provides electricity to said electric motor for powering said vehicle;

and a power management controller (14) programmed to control output of said power unit to maintain said energy storage system between a predetermined high voltage set-point and a predetermined low voltage set-point (See Fig. 5); **[claims 2 and 17]** wherein said power unit is an engine (18) in combination/coupled with a generator (22); **[claim 10]** wherein said power management system is programmed with a control algorithm to maintain an energy storage system voltage with a predetermined range; **[claim 11]** wherein said predetermined range is maintained by varying the output of said power unit.

5. Claims 1-12, 17-22, 31, 34-35 and 38-41 and 44 are rejected under 35 U.S.C. 102(e) as being anticipated by Morisawa et al. (US Patent 6,205,379 B1). Morisawa et al. discloses a hybrid electric vehicle comprised of a drive train (See Fig. 1); an electric motor (28) for driving said drive train; a power unit/engine (10,24) electrically coupled to said electric motor; an electric energy storage system (48) electrically coupled to said electric motor; and wherein said power unit and said electric storage system provides electricity to said electric motor for powering said vehicle; and a power management controller (38,46) programmed to control output of said power unit to maintain said energy storage system between a predetermined high voltage set-point and a predetermined low voltage set-point; **[claims 2 and 17]** wherein said power unit is an engine (10) in combination/coupled with a generator (24); **[claim 10]** wherein said power management system is programmed with a control algorithm to maintain an energy storage system voltage with a predetermined range (See Fig. 10); **[claim 11]** wherein said predetermined range is maintained by varying the output of said power unit; **[claim 3]** wherein said motor derives power from said energy storage system and said power unit during acceleration when said motor requires power below a predetermined average power level; **[claim**

4] wherein said power management controller is programmed to drive said motor by said electric energy storage system when said motor requires power above a predetermined average power level; **[claim 5]** an electric bus connected to both the power unit and the electric energy source (this is an inherent component in Morisawa et al.) and where the voltage across the electric bus is substantially the same as the voltage across said electric energy source so that a change in voltage of the electric bus results in the same change to the voltage across the electric energy source; **[claim 6]** wherein said power management controller is programmed to allow the power unit to recharge said electric energy storage system when power required by said electric motor is below a predetermined level (See column 24, lines 55+); **[claim 7]** wherein said power management controller is programmed to determine an optimum engine speed of said power unit for said predetermined set-points, and wherein said power management controller is adapted to control said power unit to said optimum engine speed (See column 5, line 5+); **[claim 8]** wherein said power management controller is programmed with a speed load curve to produce power at the point of lowest emissions and greatest fuel economy (See column 5, line 1+); **[claim 9]** wherein said energy storage system is a bank of ultracapacitors (48); **[claim 18]** wherein said power management controller runs the output of said power unit at said predetermined average power level when said energy storage system is at a predetermined range between said high and low voltage set-points, said range having a low threshold point and high threshold point; **[claim 19]** wherein said power management controller initiates an increase in the output of said power unit when the energy level of said energy storage system falls below the low threshold point of said range (See column 4, lines 20-40); **[claim 20]** wherein said power provides substantially all of the power when said energy storage system is at the low voltage set-point; **[claim 21]** wherein

said power management controller is programmed to control motor output to prevent said power unit from running above maximum-rated power (See column 17, lines 43-54); **[claim 22]** wherein said power management controller initiates a decrease in the output of said power unit when the energy level of said energy storage system reaches the high threshold point of said range (See column 16, lines 36-58); **[claim 23]** wherein said average power level of said power unit is adjusted during operation of said electric vehicle to optimize fuel economy (See column 17, line 43+, where the shifting of the transmission would reduce the average power level of the power unit to optimize fuel economy); **[claim 31]** wherein said power management controller is adapted to issue output commands to control motor torque, generator voltage and current, engine speed, engine power, and shift commands for transmission equipped vehicles; **[claim 35]** wherein said controller is programmed to allow the motor to recharge said electric storage system when engine power is below a predetermined level (See column 24, lines 55+); **[claim 36]** wherein said controller is programmed to substantially maintain a predetermined ratio of vehicle speed to energy storage voltage; **[claim 38]** wherein said power drawn from said engine is adjusted to substantially achieve the desired speed to voltage ratio; **[claim 39]** wherein said motor acts as a generator when said speed to voltage ratio is higher than a predetermined level; **[claim 40]** wherein generation of voltage levels in said electric energy storage system by said electric motor rises inversely proportional to vehicle speed; **[claim 41]** wherein said controller increases engine output to match required output when said electric energy storage system falls near said predetermined low voltage set-point (See column 4, lines 20-40); **[claim 44]** wherein said drive train may by placed in the neutral position by said controller so that said motor can operate as a generator to recharge the electric energy storage system.

Regarding claim 12, Morisawa et al. does not specifically disclose wherein the control algorithm is an inversely proportional ratio of vehicle speed to energy storage system voltage to achieve the optimal system performance and wherein said power drawn from said power unit is adjusted to substantially achieve the desired speed to voltage ratio. Morisawa et al. does control the engine speed/vehicle speed in relation to the voltage available in the energy storage system. Thus, the vehicle speed and energy storage system voltage are variable upon each other. The controller in Morisawa et al. is designed to maintain a set state of charge in the capacitors capable of providing electric energy to the motor-generator based on the vehicle's speed. As the driver requires acceleration of the vehicle, more energy is needed to drive the electric motor, thus more electric charge is provided to the capacitors. Therefore, Morisawa et al. inherently provides a controller to substantially maintain a predetermined ratio of vehicle speed to energy storage voltage.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lyons et al. (US Patent 5,929,595) in view of Morisawa et al. (US Patent 6,205,379 B1). Lyons et al. discloses a hybrid electric vehicle as set forth above, but does not disclose wherein said energy storage system is a bank of ultracapacitors. Morisawa et al. discloses using an energy storage

system consisting of a bank of capacitors (48). At the time of the invention, it would have been obvious to a person of ordinary skill in this art to substitute a capacitor for the batteries disclosed in Lyons et al. as taught by Morisawa et al. The motivation for doing so would have been to permit a sufficiently high rate of rise or increase of the electric energy to be supplied to the electric motor.

8. **Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morisawa et al. (US Patent 6,205,379 B1) in view of Slicker et al. (US Patent 4,766,967).** Morisawa et al. discloses a hybrid electric vehicle as set forth above, but does not specifically disclose a two-gear gearbox coupled to said electric motor and said drive train. Slicker et al. discloses a two-gear gearbox (16) coupled to the electric motor (10) and the drive train (14b). At the time of the invention, it would have been obvious to a person of ordinary skill in this art to insert a two-gear gearbox between the electric motor and the drive train in Morisawa et al. in view of the teaching of Slicker et al. The motivation for doing so would have been to modify the engine's torque and RPM to adapt them to maintain the engine's power at a relatively constant level.

9. **Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morisawa et al. (US Patent 6,205,379 B1) in view of Ibaraki (US Patent 6,098,733).** Morisawa et al. discloses a hybrid electric vehicle as set forth above, but does not disclose an auxiliary motor in electrical connection to the power unit and the electric energy storage system for driving accessory vehicle components. Ibaraki discloses an auxiliary motor (40) in electrical connection to the power unit (12,14) and the electric energy storage system (36) for driving accessory vehicle components (38). At the time of the invention, it would have been obvious to a person of ordinary skill in this art to employ an auxiliary motor to run additional accessory vehicle

components, such as an air conditioning unit, in Morisawa et al. in view of the teaching of Ibaraki. The motivation for doing so would have been to run the accessory components, including the steering, air conditioning, etc. with electric power generated from the engine, so that the accessory components could be used even when the engine is not operating.

10. Claims 16, 28-29, 37 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morisawa et al. (US Patent 6,205,379 B1) in view of Examiner's Official Notice. Morisawa et al. discloses a hybrid electric vehicle as set forth above, but does not specifically disclose wherein the electric motor is a low induction motor capable of delivering rated torque and power at the predetermined low voltage set-point. Examiner takes Official Notice that low induction electric motors are notoriously old and well known in this art. The motivation for using a low induction motor allows the AC motor to produce torque for driving the vehicle when the electric energy source is a low voltage source.

Regarding claim 28, Morisawa et al. does not specifically disclose wherein the difference between set predetermined high and low voltage points is 230 volts. At the time of the invention, it would have been obvious to a person of ordinary skill in this art to set a voltage range of 230 volts in Morisawa et al. Applicant has not disclosed that providing a 230-volt range between the high and low voltage points provides an advantage, is used for a particular purpose, or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with an equivalent voltage range depending on the charging capacity of the capacitors selected.

Regarding claim 29, Morisawa et al. does not specifically disclose wherein the power management controller is a laptop personal computer. Examiner takes Official Notice that it is

notoriously old and well known that a laptop personal computer is merely a portable controller. The motivation for using a portable controller/laptop personal computer is to allow the vehicle performance data to be collected onboard the vehicle and then analyzed in the lab.

Regarding claim 37, Morisawa et al. does not specifically disclose wherein fuzzy logic algorithms are used by the controller to adjust the speed to voltage ratio. Examiner takes Official Notice that it is old and well known to use fuzzy logic by the controller to control the HEV's operating parameters. The motivation for using fuzzy logic based supervisory controller allows the operator of the vehicle to select and transition the powertrain from one mode of operation (i.e., assist, charge, electric, or regeneration) to another in a smooth manner, without compromising emissions or drivability or introducing instabilities.

Regarding claim 46, Morisawa et al. discloses a parallel configuration HEV, not a series configuration HEV. Examiner takes Official Notice that it is old and well known in this art to use either a parallel, series or modified parallel/series drive train configuration. A person of ordinary skill in this art would have the requisite skill to choose the desired configuration based on the components selected, whether a charge sustaining or charge depleting configuration was desired, etc. The motivation for selecting between a parallel, series or modified parallel/series configuration would be to allow the vehicle to be configured to most adequately perform its desired tasks. A series configuration would be selected when propulsion is needed only from the electric motors and a parallel configuration would be selected when the engine is needed to provide additional mechanical propulsion.

11. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morisawa et al. (US Patent 6,205,379 B1) in view of Deguchi et al. (US Patent 6,233,508 B1). Morisawa et

al. discloses a hybrid electric vehicle as set forth above, but does not disclose a data acquisition component in electrical communication with the power management controller adapted to collect engine speed data, motor speed data, vehicle speed date, temperature data, motor current, generator current, acceleration commands, deceleration commands and braking commands. Deguchi et al. discloses a data acquisition component in electrical connection with the power management controller (See Fig. 2) to collect engine speed data (27), motor speed data, vehicle speed data (24), temperature data (25), motor current (26), generator current (26), acceleration commands (22), deceleration commands and braking commands. At the time of the invention, it would have been obvious to a person of ordinary skill in this art to provide the controller in Morisawa with data acquisition sensors to collect data relating to the engine and motor speeds, battery charge and operator inputs, so that the controller could efficiently run the vehicle to maximize fuel economy.

Allowable Subject Matter

12. Claims 13, 24-27, 42-43 and 45 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

13. The prior art made of record in the accompanying PTO Form 892 and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to J. Allen Shriver whose telephone number is (703) 308-1224. The examiner can normally be reached on Mon-Thurs 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chris P. Ellis can be reached on (703) 305-0168. Any inquiry of a general nature or relating to the status of this application should be directed to the group receptionist whose telephone number is (703) 308-1113.

As of May 1, 2003, any response to this action should be mailed to:

Mail Stop _____
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Or faxed to: (703) 305-3597 or (703) 305-7687 (for formal communications intended for entry. (703) 746-3852 (for informal communications directly to the Examiner).

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

J. Allen Shriver
Examiner
Art Unit 3618

JAS